CMER RESEARCH TOPICS - 2004

The following list of research topics was prepared by the staff of the Northeast Fisheries Science Center (NEFSC) and the Northeast Regional Office for guidance to faculties at the Virginia Institute of Marine Science, Hampton University, the University of Rhode Island, Rutgers University, and University of Massachusetts in developing cooperative research projects for funding through the Cooperative Marine Education and Research (CMER) Programs. Faculty interested in responding to any of these suggested topics, or a topic of their own, must submit a 2-page pre-proposal to their respective CMER Director no later than January 7, 2004. The pre-proposal should include an introduction or background section, a brief discussion of the proposed methods, anticipated results, cooperation required from NOAA (e.g., staff assistance, access to data, equipment needs, office and laboratory space, vessel time) and an anticipated budget. Please see the section on the format of pre-proposals located on the web page http://www.wh.whoi.edu/cmer/.

Faculty are encouraged to contact the individuals identified with each topic prior to submitting the pre-proposal to ensure that it is responsive to the research need. Phone numbers of the NOAA contacts are listed with each topic description. Faculty who are submitting a pre-proposal on a topic of their own choosing are also encouraged to develop collaborations with NEFSC scientists.

Investigators with continuing projects should submit a brief progress report with updated objectives and budget to their program director before January 7, 2004.

CMER Program Directors:

University of Massachusetts - Dr. Kevin Friedland (413-545-2842, e-mail Kevin.Friedland@noaa.gov)

Rutgers University - Dr. Sybil Seitzinger (732-932-6555 x342, e-mail sybil@imcs.rutgers.edu)

University of Rhode Island - Dr. Lawrence Buckley (401-874-6671, e-mail lbuckley@gso.uri.edu)

Virginia Institute of Marine Science/Hampton University – Dr. Richard Brill (804-684-7875, e-mail Richard.Brill@noaa.gov)

1. AGE AND GROWTH OF YOY BLUEFISH FROM ESTUARIES WITH DIFFERENT POLLUTION LEVELS

Work by Munch and Conover (2000) suggest that year class strength is determined regionally during the YOY estuarine phase of bluefish development and that YOY bluefish occur in two distinct cohorts, spring and summer. Researchers in the Marine Chemistry Branch at the Howard Laboratory have collected bluefish from a pristine and a contaminated estuary during the summer of 2003 to determine contaminant loads, how

these burdens affect behavioral function, and how the compounds are depurated from the fish. CMER proposals are invited to examine whether growth of bluefish is modified by habitat quality. For example, otoliths from these same fish are available for analysis (e.g., by microstructural examination) to investigate whether growth rates differ significantly within cohorts and between estuaries, implying habitat modification of growth. This information would then permit determination of birth dates and cohort identification in the NOAA contaminant studies. The CMER study would contribute to the overall goal of current NOAA research aimed at developing information on sublethal aspects of fish habitat quality.
(Contact: Beth Sharack, Phone: 732-872-3062, e-mail beth.sharack@noaa.gov; Howard Laboratory)

2) EVALUATION OF CONDITION IN OVERWINTERING MIGRANT BLACK SEA BASS

Seasonal migrant fishes require substantial energy stores to survive annual migration and overwintering. The accumulation of lipid stores prior to autumn offshore migration has been demonstrated for juvenile black sea bass (*Centropristis striata*) and other seasonal onshore-offshore migrant species (scup, weakfish, northern kingfish). In addition, strong year-to-year differences in lipid and protein content of these fish have been recorded. Black sea bass, which cannot survive winter temperatures of inshore waters in the northeast region, migrate to warmer bottom waters on the outer continental shelf. Although some feeding may occur, little growth occurs on the overwintering grounds. While young of the year sea bass preparing to depart estuaries in autumn show a wide range of lipid content, limited data suggest that those returning in spring have a generally low level and narrow range of values. What this implies about net energy budget and winter survival is not clear. What year-to-year inshore variation in protein and lipid content means is also unclear. The problem is that the energetics of overwintering in this and other seasonal migrants is not understood. The significance of this becomes even larger than black sea bass because a number of onshore-offshore seasonal migrants (e.g. scup, weakfish, summer flounder) support important fisheries in the mid-Atlantic region. Winter survival is crucial to the subsequent recruitment success, and energetics may well be crucial to survival.

Therefore, CMER proposals are requested to address the biochemical condition of migrating and overwintering black sea bass. An investigation is sought in which the lipid, water and protein content of fish in the 0 and 1 year classes is followed from fall in inshore waters through winter and early spring offshore, and back into inshore waters in late spring, in addition to the assessment by various morphometric condition indices, analysis of gut contents, and of gonadal development (if any). Specimens for analysis from offshore locations can be provided from survey cruise through cooperating NEFSC investigators. Participation in NEFSC cruises by CMER investigator(s) is strongly encouraged. Methods and facilities for biochemical analysis can also be provided cooperatively, if desired.
(Contact: Vincent G. Guida, Phone: (732) 872-3042, e-mail vincent.guida@noaa.gov; Howard Laboratory)

3) EVALUATION OF FOOD VALUES FOR TROPHIC RESOURCES OF SMALL PELAGIC FISHERIES SPECIES

NOAA Fisheries is about to explore a new, more holistic concept for the management of fisheries resources: the Ecosystem Management Approach. In line with this new thrust, NEFSC has begun to organize a program, along the lines of the matrix management principal, called Energy Modeling and Analysis Exercise (EMAX). Participants in this program will work toward development of a more dynamic, interactive understanding of the pelagic ecosystem in the northeast region in terms of energy transfer. Work will center on small pelagic fisheries resources (e.g. silver hake, Atlantic herring, Atlantic mackerel, longfin squid, butterfish), their interactions with each other, and with other ecosystem elements (e.g. hydrography, plankton, benthos, non-target species, demersal fisheries species, marine mammals). In particular, the program will address the issues of system production and biomass tradeoffs among species that appear to result from periodic system fluctuations, inherent system patchiness, and aperiodic disturbances.

Small pelagic species (e.g. the species listed above minus Atlantic herring) have extremely varied diets that probably allow them to persist in the face of fluctuations, patchiness and disturbance. Atlantic mackerel, for instance, are known to alternate feeding modes between filter feeding for zooplankton and active pursuit of a wide variety of nektonic prey. The wide range of food consumed and the generally high metabolic requirements of pelagic organisms raise questions about the values of particular dietary items toward biomass production in the consumers. Both mackerel and butterfish can consume gelatinous zooplankton, but an exclusive diet of these may or may not be sufficient for growth and reproduction. Euphausid and decapod shrimp are important in the diets of several pelagic species, but there is little data to compare their value with those of squid or pelagic fishes that are also consumed. Dietary items of high protein and especially high lipid content (i.e. high energy density) therefore may be at a premium, and even represent a limiting factor for production of very active pelagic species. Unfortunately, there is little data on energy density of dietary items to support or refute such a hypothesis.

A request is therefore made for CMER proposals for the investigation of the energetic values of food organisms in the diet of the Atlantic mackerel (Scomber scombrus), the "small pelagic" with perhaps the widest diet, and if possible, to related diet to growth and/or production in that fish species. Data collection will involve a combination of literature survey for growth/production and energetic values and data from laboratory analysis of collected samples. To the taxonomic extent that food species are identified, major food items such as copepods, mysid, euphausid and decapod shrimps, fish larvae, squid, and fishes should be considered. Calorimetric data is acceptable, but data based on crude protein, lipid and water content is preferred, especially in the case of crustaceans with their high content of energetically rich, but indigestible chitin.

(Contact: Vincent G. Guida, Phone: (732) 872-3042, e-mail vincent.guida@noaa.gov; Howard Laboratory)

4. DEVELOPMENT OF A FLUOROESENCE SENSING SYSTEMS FOR MONITORING CHLOROPHYLL-A LEVELS IN BIVALVE LARVAL REARING CONTAINERS.

The goal of the proposed project would be to address the problem of measuring chlorophyll-a fluoresence in bivalve rearing containers without any physical presence in the container. Bivalves are filter feeders feeding on single celled phytoplankton that is added to their rearing containers. The Milford Laboratory has developed an automated feeding system for juvenile bivalves that is dependent on flow through fluorometers. This system maintains chlorophyll-a levels by adding phytoplankton to a shellfish culture as the measured chlorophyll-a level decreases due to filter feeding. Attempts to use this system with bivalve larvae have resulted in decreased growth and survival when compared to traditional Milford larval rearing methods. Decreases in larval growth and survival are most likely due to injuries resulting from physical interactions with pumps and screens used by the monitoring system. Development of a fluorometer which can measure chlorophyll-a levels without the use of a pump or flow through system would prevent larval damage and allow us to monitor larval behavior. Systems should be able to monitor the chlorophyll-a fluoresence level of the seawater in the rearing container without physically impacting the bivalve larvae. Systems should be configured to measure from 0.0 - 75.0 µg/L and output a linear 0-5V signal or digital equivalent to ensure compatibility with existing software. All systems should be built to NEMA 4 specifications since they will be utilized in a marine environment. A minimum of four and maximum of eight fluoresence sensing systems will be required for further experimentation with shellfish larvae.
(Contact: James Widman, 203-882-6508, jwidman@mi.nmfs.gov)

5. EVALUATING ESSENTIAL FISH HABITAT (EFH) OF SUMMER FLOUNDER, *PARALICHTHYS DENTATUS*, DURING ITS EARLY LIFE HISTORY

Summer flounder is a key commercial and recreational species of the Mid-Atlantic coast. Despite evidence of abundant spawning in waters of southern New England and the New York Bight, recruitment to the juvenile stage of summer flounder in this region is typically low and often highly variable. Our previous work at the Howard Laboratory has provided realistic estimates of growth and developmental rates of young flounder as they might be expressed under autumn to spring conditions in nature. These estimates suggest that cool temperatures of winter are unlikely to be a direct source of mortality but they may be key in prolonging the duration of pelagic life-stages that are especially vulnerable to predation.

We would like to see this research on growth and developmental rates of egg, larval, and young-of-the-year juvenile summer flounder linked with physical oceanographic estimates of water temperature and flow patterns for the southern New England and mid-Atlantic Bight regions. A goal of this project is to wed temperature and flow models with biological parameter estimates to identify recruitment potential of the region under different scenarios typical of regional and interannual variation in the physical environment and in the time and location of summer flounder spawning. With the linkage of such information, researchers can assess the role of the physical habitat in affecting developmental rates as well as advecting larvae to waters distant from where they were spawned.
(Contact: Chris Chambers, Howard Lab (732 872-3075, chris.chambers@noaa.gov)

6. EVALUATING ESSENTIAL SHELLFISH HABITAT (EFH) OF HARD CLAMS, MERCENARIA MERCENARIA, DURING ITS LARVAL SETTLEMENT STAGE

Hard Clams (northern quahogs), *Mercenaria mercenaria*, are important commercially and recreationally in bays along the Atlantic Coast from eastern Canada to Florida. More work needs to be done with this species to examine the role that substrate selection by its late-stage larvae has in determining the distribution and abundance of the clams. Our surveying and surveys by the State of New Jersey show that the clam is found in a variety of substrates. In Raritan Bay, N.J., the clams are found in substrates of sand, mud, and fecal pellets. In SE Raritan Bay, the clams are more abundant in a substrate consisting of fecal pellets than in one consisting of sand. Most pellets are produced by the amphipod, Ampelisca abdita (Mills, 1969; MacKenzie et al., In Press). This suggests the clams may select a substrate of fecal pellets, but in this case their abundance may also be related to the mats of tubes the amphipods produce over the substrate. Passive concentration of clams in depositional areas may be acting in concert with or instead of active selection.

We would like to see laboratory research, perhaps at the Rutgers flumes, on sediment selection by ready-to-set hard clam larvae as an aid in determining why the clams are distributed as they are in Raritan Bay and other areas. A goal of this project is to determine whether the distribution of the clams is partially influenced by the presence of different sediment types. This is important in Raritan Bay and other bays because various anthropogenic activities, such as channel dredging and pipe laying in addition to pollution that can influence the abundances of pellet-producers, can lead to modifications in sediment types.

(Contact: Clyde MacKenzie, Howard Lab, 32-872-3019, clyde.mackenzie@noaa.gov)

7. THE ROLE AND CULTURE OF SUBSISTENCE FISHING IN HOUSEHOLD FOOD SECURITY IN NEW ENGLAND.

The extent to which recreational fishing helps to satisfy the food security needs (particularly animal protein) of households in New England is poorly understood. Analysis is sought to understand the pervasiveness and importance of subsistence fishing within a cultural framework. Answers are sought to questions such as the following: 1) What are the ethnic and cultural norms for those most dependent on subsistence fishing? 2) To what extent does subsistence fishing satisfy the protein needs of households? and 3) To what extent do factors outside the household influence the pursuit of subsistence fishing?

(Contact: Phil Logan, 508-495-2354, plogan@whsun1.wh.whoi.edu)

8. HUMAN DIMENSIONS OF ECOSYSTEM BASED MANAGEMENT

Increasing concerns to create management that is ecosystem-based will require input from social scientists interested in human-ecosystem relationships in order to rectify conceptions of fishermen as simply predators. Rather, the role of culture demands an understanding of the motivations and values underlying the practices and decision-making of different fishermen, while ecosystem management demands understandings that are temporally and spatially sensitive. Thus analyses using ethnographic and survey techniques are sought that will document seasonal and spatial changes in fishing practices of uniquely identifiable vessels and/or individual fishermen, with particular emphasis given to understanding the reasons for such changes.

(Contact: Phil Logan, 508-495-2354, plogan@whsun1.wh.whoi.edu)

9. ENVIRONMENTAL JUSTICE IN NEW ENGLAND AND THE MID ATLANTIC

The Executive Order 12898 of February 11, 1994 on Environmental Justice requires federal agencies to consider the impacts of any action on disadvantaged, at risk and minority populations. Vulnerable populations may include but are not limited to, income poor groups, ethnic minorities, female headed households, uneducated groups, children and the elderly.

Only recently have environmental justice issues become a focus of attention of in New England and the Mid Atlantic. Although EPA has been working on identifying potential environmental justice areas and interfaces with their activities, NOAA has little information on how these issues relate specifically to fisheries management. Case studies on vulnerability and marginalization among individuals involved in fishing and fishing related activities will improve the ability to predict impacts of regulatory change on certain individuals/groups. The Social Science Branch (SSB) at NOAA is funding a larger initiative on Environmental Justice and Marine Resources this year which will involve the development of a vulnerability index. Case studies developed under CMER funding would complement this initiative by further illuminating the social processes associated with Environmental Justice issues. Case studies from New England or the Mid Atlantic would be welcome.

(Contact: Phil Logan, 508-495-2354, plogan@whsun1.wh.whoi.edu)

10. AN EVALUATION OF THE VIABILITY OF VARIOUS FORMS OF COMMUNITY MANAGEMENT IN URBAN AND INDUSTRIAL SETTINGS, WITH AN EYE TO POSSIBILITIES FOR THIS TYPE OF MANAGEMENT IN THE NORTHEAST

The Social Sciences Branch (SSB) is currently funding a study of community-based responses to management in the Northeast. The social science literature describes a variety of instances where community-based management has been highly effective in small-scale communities and fisheries, but industrial fisheries are less well documented. Some industrial fishery examples are available, e.g. building on an existing local management tradition (Maine lobster areal management) or the assigning of quota to a community group (Newfoundland quotas assigned to fishermen's associations -- citations and/or contact persons provided on request)1.

This study would research existing community-based management practices in Urban and industrial fisheries (primarily formal governmental management such as community-based quotas, but also informal practices that would easily be added to the formal repertoire because of their similarity to formal practices), and attempt to describe conditions (within communities and fisheries) that lend themselves to community-based management.. Alaska’s Community Development Quotas, being primarily an economic development tool, would not be relevant to this study.

(Contact: Phil Logan, 508-495-2354, plogan@whsun1.wh.whoi.edu)

11. ECOSYSTEMS INDICATORS

The NEFSC is developing and applying biological and physical indictors and indices that quantify changing ecological conditions in the US Northeast Shelf Large Marine

Ecosystem. The focus of the study is the merger of productivity, fish and fisheries, and pollution indicators into a suite of indicators for monitoring and assessing change throughout the spatial extent of the NE Shelf Ecosystem. CMER proposals are requested that are relevant to the use of time series data within the NOAA and EPA data management system on plankton, fish, and coastal pollution, that can serve as quantitative indicators of changes in the ecological condition of the NE Shelf Ecosystem. (Contact: Ken Sherman, Kenneth.Sherman@noaa.gov, Tel: (401) 782-3211)

12. THE ROLE OF SQUIDS IN POLLUTION DYNAMICS.

Cephalopods are known to accumulate pollutants, particularly in their digestive glands. Cephalopods, especially squids, are also well-known to be important members of marine food webs. However, no assessment has been made about how these two facts interact to affect the dynamics of pollutants in marine ecosystems. Bartol et al. (2002) have recently shown that at predicable times squids are among the most abundant nektonic organisms in the lower Chesapeake Bay. This project could therefore use collections being made for the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP; http://www.fisheries.vims.edu/chesmmap/) as a model system to examine the role of squids in marine pollution dynamics.

(Contact: Michael Vecchione, NMFS National Systematics Laboratory, 202-357-4990, e-mail michael.vecchione@noaa.gov)

Bartol, I.K., R. Mann and M. Vecchione. 2002. Distribution of the euryhaline squid Lolliguncula brevis in the Chesapeake Bay: effects of selected abiotic factors. Mar. Ecol. Prog. Ser. 226: 235–247.